Ear Hear. 2013 Sep;34(5):651-60. doi: 10.1097/AUD.0b013e31828d27d7.

Xylene-induced auditory dysfunction in humans.

Fuente A[1], McPherson B, Cardemil F.

Author information

[1]School of Speech and Hearing Sciences, Facultad de Medicina, Universidad de Chile, Santiago, Region Metropolitana, Chile. afuente@med.uchile.cl

Abstract

OBJECTIVES: Animal data indicate that xylene induces cochlear dysfunction, characterized by the loss of outer hair cells. There is little evidence regarding xylene-induced ototoxicity in humans. The aim of the study was to investigate the possible adverse effects of xylene on the peripheral and central auditory system in humans.

DESIGN: A total of 30 medical laboratory workers who had been exposed to a mixture of xylene isomers, together with 30 nonexposed control participants matched for gender, age, and educational level were selected. Participants of both groups were not exposed to noise levels above 85 dBA time-weighted average. All participants were evaluated with a comprehensive audiological test battery, which included measures of peripheral and central auditory function. Peripheral auditory measures included pure-tone audiometry and distortion product otoacoustic emissions. Behavioral measures of central auditory function included a pitch pattern sequence test, an adaptive test of temporal resolution, a dichotic digit test, and a masking level difference test. The auditory brainstem response was used to objectively evaluate the function of the auditory pathways at the brainstem level. Speech perception in quiet and in noise was evaluated using the Hearing In Noise Test (HINT). The xylene-exposed participants were extensively evaluated with regard to their exposure to both noise and xylene. Noise dosimetry was conducted over an 8-hr work shift to obtain noise-exposure levels for each xylene-exposed worker. Airborne xylene concentrations were obtained at 11 different workstations throughout the medical laboratories, and methyl hippuric acid levels per gram of creatinine in urine were obtained for each xylene-exposed subject. Finally, a detailed interview exploring current and past solvent and noise exposure was conducted.

RESULTS: The xylene-exposed participants showed significantly worse pure-tone thresholds in comparison with the nonexposed participants. The xylene-exposed participants demonstrated significantly worse results than the control group participants for the pitch pattern sequence test, dichotic digit test, HINT, and the auditory brainstem response (absolute and interpeak latencies). No significant differences between the xylene-exposed and nonexposed participants were observed for distortion product otoacoustic emissions, adaptive test of temporal resolution, or the masking level difference test. A significant correlation between the concentrations of methyl hippuric acid in urine and pure-tone thresholds (2 to 8 kHz) was found in xylene-exposed workers.

Also, participants with high cumulative dose of xylene exposure presented with poorer test results than participants with low cumulative dose of xylene exposure.

CONCLUSIONS: The results of the present research suggest that xylene is associated with adverse central auditory effects and poorer sound detection abilities in humans. A major limitation of the study is that the results found among xylene-exposed participants cannot be proved to be permanent, and thus further research should be conducted to clarify this limitation. Workers exposed to this chemical should be routinely evaluated with a comprehensive audiological test battery, to detect early signs of auditory dysfunction.

PMID: 23598724 DOI: 10.1097/AUD.0b013e31828d27d7

[PubMed - indexed for MEDLINE]

The Adverse Effects of Heavy Metals with ar PubMed

Environmental Cadmium and Lead Exposures and

Environmental cadmium and lead exposures a PubMed

See more...

Publication Types, MeSH Terms, Substances

LinkOut - more resources

PubMed Commons

PubMed Commons home

0 comments

How to join PubMed Commons